

[0269] Again, by way of example, in various embodiments, the conductivity of the subject media at position 4702 as shown in FIG. 47 may be determined utilizing sensor manifold 4100. In such embodiments, subject media flows into tube connector 4112 (as shown in FIG. 41) through fluid path 4221 (as shown in FIG. 42) and exits at tube connector 4113 (as shown in FIG. 41). The conductivity of the subject media is measured by two sensing probes (not shown) extending into fluid path 4221, at least one of which has been configured to include a temperature sensing element, such as a thermistor. The conductivity measurement or the temperature measurement of the subject media may be utilized to determine and/or correlate a variety of information of utility to the hemodialysis system. For example, in various embodiments at position 4702 in FIG. 47, the subject media may be comprised of water to which a bicarbonated base solution and then an acid based solution has been added. Conductivity of the subject media at position 4702 may be utilized to determine if the appropriate amount of the acid based solution (and the bicarbonate based solution in a previous step) has been added prior to position 4702. In certain embodiments, if the conductivity measurement deviates from a predetermined range or deviates from a predetermined measurement by more than a predetermined amount, then the subject media may not contain the appropriate concentration of the acid based solution and the bicarbonate based solution. In such instances, in certain embodiments, the hemodialysis system may be alerted.

[0270] By way of further example, in various embodiments, the temperature and conductivity of the subject media at position 4703 as shown in FIG. 47 may be determined utilizing sensor manifold 4100. In such embodiments, subject media may flow into or out of tube connector 4107 (as shown in FIG. 41) through fluid path 4222 (as shown in FIG. 42) and may flow into or out of tube connector 4109 (as shown in FIG. 41). As described herein, air may be removed from the subject media as it moves past the turn in fluid path 4222. In such instances, a portion of the subject media may be removed through tube connector 4108 to the drain, bringing with it air from the air trap. The conductivity of the subject media is measured by two sensing probes (not shown) extending into fluid path 4222, at least one of which has been configured to include a temperature sensing element, such as a thermistor. The conductivity measurement or the temperature measurement of the subject media may be utilized to determine and/or correlate a variety of information of utility to the hemodialysis system. For example, in various embodiments, the conductivity measurement at position 4703 in FIG. 47 may be utilized to correlate to the clearance of the dialyzer. In such instances, in certain embodiments, this information may then be sent to the hemodialysis system.

[0271] Again, by way of further example, in various embodiments, the temperature of the subject media at position 4704 as shown in FIG. 47 may be determined utilizing sensor manifold 4100. In such embodiments, subject media flows into tube connector 4103 (as shown in FIG. 41) through fluid path 4223 (as shown in FIG. 42) and exits at tube connector 4104 (as shown in FIG. 41). The temperature of the subject media is measured by one or more sensing probes (not shown) extending into fluid path 4223. The temperature measurement of the subject media at position 4704 may be utilized to determine and/or correlate a variety of information of utility to the hemodialysis system. For

example, in various embodiments at position 4704 in FIG. 47, the temperature of the subject media is determined downstream of a heating apparatus 4706. If the temperature deviates from a predetermined range or deviates from a predetermined measurement by more than a predetermined amount, then the hemodialysis system may be alerted. For example in certain embodiments, the subject media may be re-circulated through the heating apparatus 4706 until the temperature of the subject media is within a predetermined range.

[0272] Again, by way of further example, in various embodiments, the temperature and conductivity of the subject media at position 4705 as shown in FIG. 47 may be determined utilizing sensor manifold 4100. In such embodiments, subject media flows into tube connector 4110 (as shown in FIG. 41) through fluid path 4224 (as shown in FIG. 42) and exits at tube connector 4111 (as shown in FIG. 41). The conductivity of the subject media is measured by two sensing probes (not shown) extending into fluid path 4224, at least one of which has been configured to include a temperature sensing element, such as a thermistor. The conductivity measurement or the temperature measurement of the subject media may be utilized to determine and/or correlate a variety of information of utility to the hemodialysis system. For example, the temperature and conductivity measurement at position 4705 may be used as a further safety check to determine if the temperature, conductivity, and, by correlation, the composition of, the subject media is within acceptable ranges prior to the subject media reaching the dialyzer 4707 and, thus, the patient. In certain embodiments, if the temperature and/or conductivity measurement deviates from a predetermined range or deviates from a predetermined measurement by more than a predetermined amount, then the hemodialysis system may be alerted.

[0273] For the various embodiments described herein, the cassette may be made of any material, including plastic and metal. The plastic may be flexible plastic, rigid plastic, semi-flexible plastic, semi-rigid plastic, or a combination of any of these. In some of these embodiments the cassette includes one or more thermal wells. In some embodiments one or more sensing probes and/or one or more other devices for transferring information regarding one or more characteristics of such subject media are in direct contact with the subject media. In some embodiments, the cassette is designed to hold fluid having a flow rate or pressure. In other embodiments, one or more compartments of the cassette is designed to hold mostly stagnant media or media held in the conduit even if the media has flow.

[0274] In some embodiments, the sensor apparatus may be used based on a need to separate the subject media from the sensing probe. However, in other embodiments, the sensing probe is used for temperature, conductivity, and/or other sensing directly with subject media.

[0275] Although the above discussion discloses various exemplary embodiments of the invention, it should be apparent that those skilled in the art can make various modifications that will achieve some of the advantages of the invention without departing from the true scope of the invention. While the principles of the invention have been described herein, it is to be understood by those skilled in the art that this description is made only by way of example and not as a limitation as to the scope of the invention. Other embodiments are contemplated within the scope of the present invention in addition to the exemplary embodiments